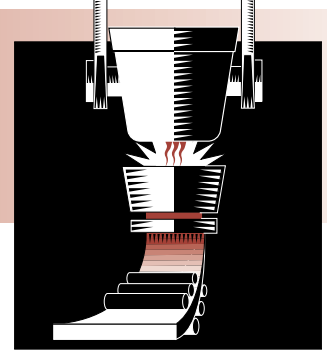


# STEEL

## Project Fact Sheet



## DEVELOPMENT AND APPLICATION OF LASER-ASSISTED ARC WELDING TO STEEL

### BENEFITS

- Allow a wider choice and thickness of materials
- Provide a greater flexibility of welding joint geometries
- Increase welding throughput and productivity over either laser or arc welding

### APPLICATIONS

The project will develop a Laser-Assisted Arc Welding process for steel welding applications. This process will combine an arc welding system with a laser welding system to take advantage of desirable features available in each system.

### LASER-ASSISTED ARC WELDING PROVIDES GREATER FLEXIBILITY IN MATERIALS, JOINT GEOMETRIES, WHILE MAINTAINING WELDING SPEED

This process, when applied to steel welding, would meet the needs for a new joining technology. Among other things, the benefits of the combined laser and arc welding process would ease the current requirement for precise fit-up when laser welding alone. In addition, with the use of filler metals in the arc welding component of the process, there would be greater flexibility in the choice of materials that are joined and the process could be easily applied to non-linear joint geometries. It is expected that the Laser-Assisted Arc Welding process would be advantageous in many applications including tailored-blank welding, dissimilar metal welding, and mill coil joining applications. This project is designed to develop and apply the Laser-Assisted Arc Welding process for steel welding. The system design would be optimized for steel applications to bridge the wide joint gaps that are currently unacceptable for autogenous laser welding. Process development will focus on the application to low-carbon and high strength low alloy steels.

### IDAHO NATIONAL ENGINEERING AND ENVIRONMENT LABORATORY'S WELD HEAD



The development of Laser-Assisted Arc Welding would benefit both tailored-blank welding and mill coil joining.

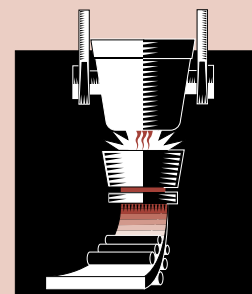


## Project Description

**Goal:** Develop an industrial Laser-Assisted Arc Welding process for steel applications capable of implementation into manufacturing production lines. Two Laser-Assisted Arc Welding processes are being developed: 1) Combined plasma arc welding / laser beam welding suited for autogenous applications where increased non-linear welding capabilities and welding / laser speeds are desired; and 2) Gas metal arc welding / laser beam welding system suited for applications involving poor fit-up, dissimilar materials and thickness, and thicker penetration.

## Progress and Milestones

- Project start date, September 1997.
- Laboratory prototype Laser-Assisted Arc Welding built and performance characteristics assessed.
- Laser-Assisted Arc Welding weld pool geometry successfully modeled using neural network analysis.
- Design of industrialized Laser-Assisted Arc Welding equipment completed, September 2000.
- Demonstration of Laser-Assisted Arc Welding process in commercial test bed, March 2001.
- Project completion date, March 2001.



### PROJECT PARTNERS

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